

The New Atlas of Israel – The National Atlas

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Abstract. The New Atlas of Israel – The National Atlas was published in English for the first time in 2011 by the Survey of Israel and the Hebrew University of Jerusalem. The Atlas gives expression to geography of the region, reflecting its unique location. **The New Atlas of Israel – the National Atlas**, in its English edition, is based upon a translation of the Hebrew edition published in August 2009, which was in effect a new edition which updated and expanded upon the 1995 edition. The 1995 departed from the large format series of the traditional Atlas of Israel, which included scientific articles in addition to maps. The New Atlas of Israel was planned for geography pupils, using the most advanced methodologies and technologies, in a size that fits school bags. Hundreds of maps, and tens of diagrams were prepared for the 2011 atlas, using innovative methods that were published in blaze of colors, in order to allow readers and students to recognize the physical components of the landscape of Israel and the plethora of human, social, economic and settlement phenomena of the land of Israel. Special attention was given to the development of the human and settlement landscape in the last one hundred years. Here special emphasis has been placed on the layout of the population and the economy in Israel, in the most recent generations.

Keywords: National Atlas, Computerized Cartography, GIS, Geographic Education

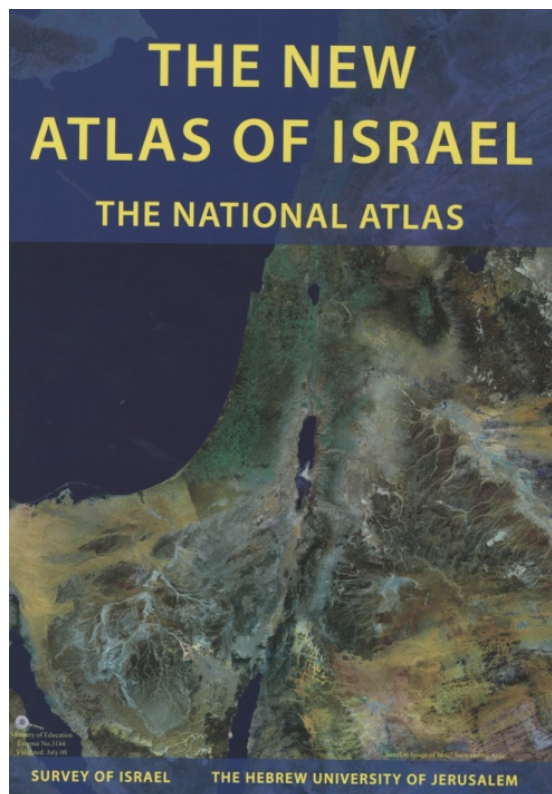


Figure 1: The cover of the atlas

1. Introduction

The New Atlas of Israel gives expression to the geography of the location of the land of Israel. The land of Israel lies at the intersection between three continents - Asia, Europe and Africa. It is located between east and west, north and south, between the Mediterranean Sea and the Red Sea and includes part of the Dead Sea, the lowest place in the world, along the Syrian-African Rift. Its location between seas on the border of the desert, where different climate zones converge offers geographic phenomena of great contrasts, within a small area. Israel is distinguished by a variety of landscapes arising from physical conditions, including tectonic activities, as well as from the climatic variety. Israel is also distinguished by its historical, political and social processes. Important historical processes which took place in the geographical region of Israel are manifested in its landscape. They began with the wars between ancient regional powers: Egypt, Babylon and Assyria, and continued with the Greek and Roman periods, the Byzantine period, the Arab conquest, the wars of the Crusaders, the Mamluk and Ottoman periods and the British Mandate. But above all stands the religious and cultural heritage, including the development of the monotheistic religions: Judaism, Christianity and Islam, the holy places of which are spread all over the country.

Central phenomena in the world, among them fast population growth and global warming leave a substantial mark on the geographic features of Israel. The population between the Mediterranean Sea and the Jordan River which numbered two hundred thousand people in the 19th century and approximately one million people eighty years ago numbers today over eleven million people: Jews, Arabs and others. The fast demographic, social and economic changes continue to reshape the map.

The cartography of the land of Israel has deep historical roots, beginning with a mosaic map dating from the sixth century, which was discovered in Madaba, Jordan, but featuring more prominently in the cartography of the middle-ages and the beginning of modern times. This is a consequence of the conception of the land of Israel as the "Holy Land", and a result of its global religious significance and the cultural connection of the nations of Europe to it.

The new edition of The New Atlas of Israel excels by offering a broad perspective in geography, earth sciences, and land of Israel studies; and is appropriate for students in these fields and also for students and enthusiasts from the world over as well as researchers and scholars. All data was received from governmental sources and elite researchers and advisors who excel in their reliability. The atlas can be used for a basic knowledge of the physical and human components of the land of Israel, its landscape and achievements.

The atlas is characterized by unique innovations, among them the use of advanced

technologies of satellite imagery and aerial photography. It illustrates a series of geographic maps of Israel, and attached to each section are satellite images of the same area. The comparison allows the reader to delve deeply into the research method and the cartographic expression found within the technology of satellite imagery. The chapter on population details central demographic processes which have shaped the population of Israel and fixed its spatial distribution. Worthy of special mention, are the maps which describe the periods of immigration to Israel, as well as the decisive importance of the city in the outline of settlement in Israel. In the field of economics, for the first time a map of high-tech industry distribution appears. Israeli planning maps and maps which focus on environment quality have been included in the atlas.

The atlas is highly innovative with regard to content, technological and didactic perspectives. The atlas reflects subjects that are relevant to current reality and to significant issues on the public agenda. Amongst the innovations is a boundary map which presents a current situation report of the borders of Israel and their international status. Subject maps present Israel in comparison with Middle Eastern countries and world countries according to particular indexes. This presentation facilitates the examination of Israel's relative position in the world. The development of the desert frontier ("making the wilderness bloom") finds expression in maps and orthophoto comparing the situation today with the situation on the eve of the establishment of the State of Israel. In the atlas, expression is given to spatial planning policy in Israel, including metropolitan centers and transportation; demographic and social processes, reflecting changes in the employment structure and the economy of the country.

The focus of the editorial staff throughout all the stages of map preparation was on didactic innovations, which assimilate the ideas and comments of geography teachers and educators who use the atlas. User friendly maps were sought, which would facilitate comparisons across various fields. To this end innovative technologies were applied, based upon full computerization; the use of GIS and image processing.

Dogmas of didactic innovation are manifest in comparisons between spatial expressions through maps and orthophoto, and oblique views in various topographies. These dogmas instruct that the preference for a selected technology depends on the type of topography and landscape. To enhance clarity of expression for instance, orthophoto backgrounds were combined with certain village settlements and city maps.

Oblique aerial photographs were added to metropolitan and transportation maps, in order to give a more true expression to spatial reality. Many didactic improvements were

achieved, as mentioned, on the basis of the use of innovative remote sensing technologies; spatial processing of aerial photography and GIS analysis. These allow a rich and diverse presentation of geographic phenomena. It is worth noting the use of characteristic satellite images of synoptic situations and the use of innovative computer processing for the creation of visual expression of sea bathymetry.

Most of the statistical data regarding Israel was provided by the Central Bureau of Statistics. Global data was based on publications of the United Nations.

2. Background and roots

The preparation of a scientific national atlas of Israel based on research began in 1952. This was a very large format atlas. Many top academic researchers and scholars were involved in the preparation of thematic chapters. These chapters included both thematic maps and scientific articles which summed up cartographically and verbally the wide research in the geography of Israel. The first edition was published gradually as separate thematic chapters between the years 1956-1964. Then, the separate chapters were assembled to one large volume atlas named **The Atlas of Israel**. The first edition of the atlas was in Hebrew and held 720 maps.

The second edition of the Atlas of Israel was published in English in 1970 holding 510 maps in a similar format to the first edition. The third and last edition of the atlas in a large format was published in 1985. This bilingual edition was an update of the previous editions, containing maps, texts and verbal explanation to maps. The Atlas of Israel put from its very beginning very high standards of cartographic work in Israel. This was reflected in evaluation articles in professional journals abroad.(Kadmon., 1984). The third edition included various cartographic innovations regarding municipal subjects, commuting and ecology and air pollution. Computer aided cartography was implemented for the production of part of the maps. The partial automation and the cartographic innovations augmented the esthetic approach but the use of the atlas was still limited to the academic community, scholars and collectors.

This brought Prof. Arie Shachar – who became later the first editor-in-chief of the New Atlas of Israel – to an initiative to prepare an alternative atlas which will be widely used and mainly by pupils and students. The new atlas, called **The New Atlas of Israel**, was designated to be a tool for learning and teaching geography, and to enable the Israeli reader and

student to recognize the diverse aspects of the geography of the land of Israel, to know the cartographic methods, exposed via hundreds of colorful maps, to know physical components of the landscape and to widen knowledge regarding human phenomena, as well as social, economical and settlement aspects characterizing the land of Israel (Shachar, 1995).

Originally, the New Atlas of Israel was intended for the use of geography learning in high school, including extraction of information from the Atlas of Israel, reduced to a smaller format to fit a school bag. The intention was to preserve a proper cartographic expression and high quality production and esthetic graphics (Kadmon, 1984).

The work on the preparation of the first edition of the New Atlas of Israel began in 1983 and the atlas was published in 1995 as a joint venture between the Survey of Israel and the Hebrew University of Jerusalem. It soon became an integrated part of the syllabus of geography learning in high schools.

3. Legibility and learning effectiveness study

The recognition of the need to update the first edition of the New Atlas of Israel matured in 2000 and launched a comprehensive preliminary study at the department of geography of the Hebrew University of Jerusalem. The research, which was funded by the Survey of Israel, checked the map legibility and learning effectiveness of the atlas. The lessons learned were implemented in the preparation of the second edition of the atlas that began in 2002. The study was also introduced in ICC2005 in Coruna, Spain. (Shachar et al, 2005).

The aforementioned study intended to check the need for revision of the cartographic principles used in the preparation of the first edition. In addition, the study intended to check the map legibility of students – 1st and 2nd year geography students in university – and to develop new cartographic methods in order to improve the map legibility of students. Map legibility is defined as the capacity of identification and interpretation of cartographic information presented in maps and graphs. The study's population comprised of 105 students. Half of them didn't have any previous experience in geography.

The students' legibility was tested by the level of complexity of the cartographic expression and by the level of understanding of the map contents. The elements used were symbols (like points, bars and polygons), color schemes (hot and cold color scales, tints of the same color, u-shaped scale) and categorization of graphic symbols (proportional symbols like circles, 3-d symbols and non proportional like size groups). The level of understanding of the map contents was checked by interpretation of satellite images, identification of features on

the image in comparison to a map of the same area and by checking the effectiveness of legend on satellite images. The legibility of maps regarding geospatial information as a result of integration of data from various sources was also checked.

The study tools included a selection of maps from the first edition of the New Atlas of Israel and a questionnaire testing the legibility of students and statistical analysis of the results. The results showed high success regarding the correlation between colors, sizes and shapes for the identification of agricultural and man-made features. Other results showed failure of identification of natural hydrographic features as well as sand areas. Failure or at most low success was found regarding identification of features on satellite images. The geospatial analysis with regard to the effectiveness of cartographic symbols in thematic maps showed effectiveness of integration between shape and color, while the exclusive use of color schemes was not fully effective. The study found limited potential learning if based only on geo-statistical analysis and deduction. As a result of the study the New Atlas of Israel was re-designed. The result of the new design is the second edition of the New Atlas of Israel which was published in Hebrew in 2009 (A preliminary edition was published in 2008) and in English in 2011 under the name: The New Atlas of Israel – The National Atlas.

4. GIS based cartographic production

The previous editions of the Atlas of Israel were prepared manually. The New Atlas of Israel – The National Atlas is based on a geospatial data base (The National GIS of the Survey of Israel) and on thematic layers from data bases of other Government ministries and agencies. The data, including the geo-statistical data, is integrated by the Survey of Israel. The Survey is supported by academic consultants, mainly from the Hebrew University of Jerusalem. The external data layers are processed in order to be adapted topologically to the National GIS and to the appropriate scales of presentation in the atlas. Since the data from the National GIS is more detailed than required for the map scales of the atlas, a generalization of the data is required. The generalization is required mainly for the hydrographic features and for constructions according to the land use. A reduction is done to layers of points. Automatic name placement follows dedicated tables.

The technical task of the production of the atlas requires integration of graphic geographic information and geo-statistical data. The options were: to scan and digitize existing material from the previous edition and to process the data for the production of computerized

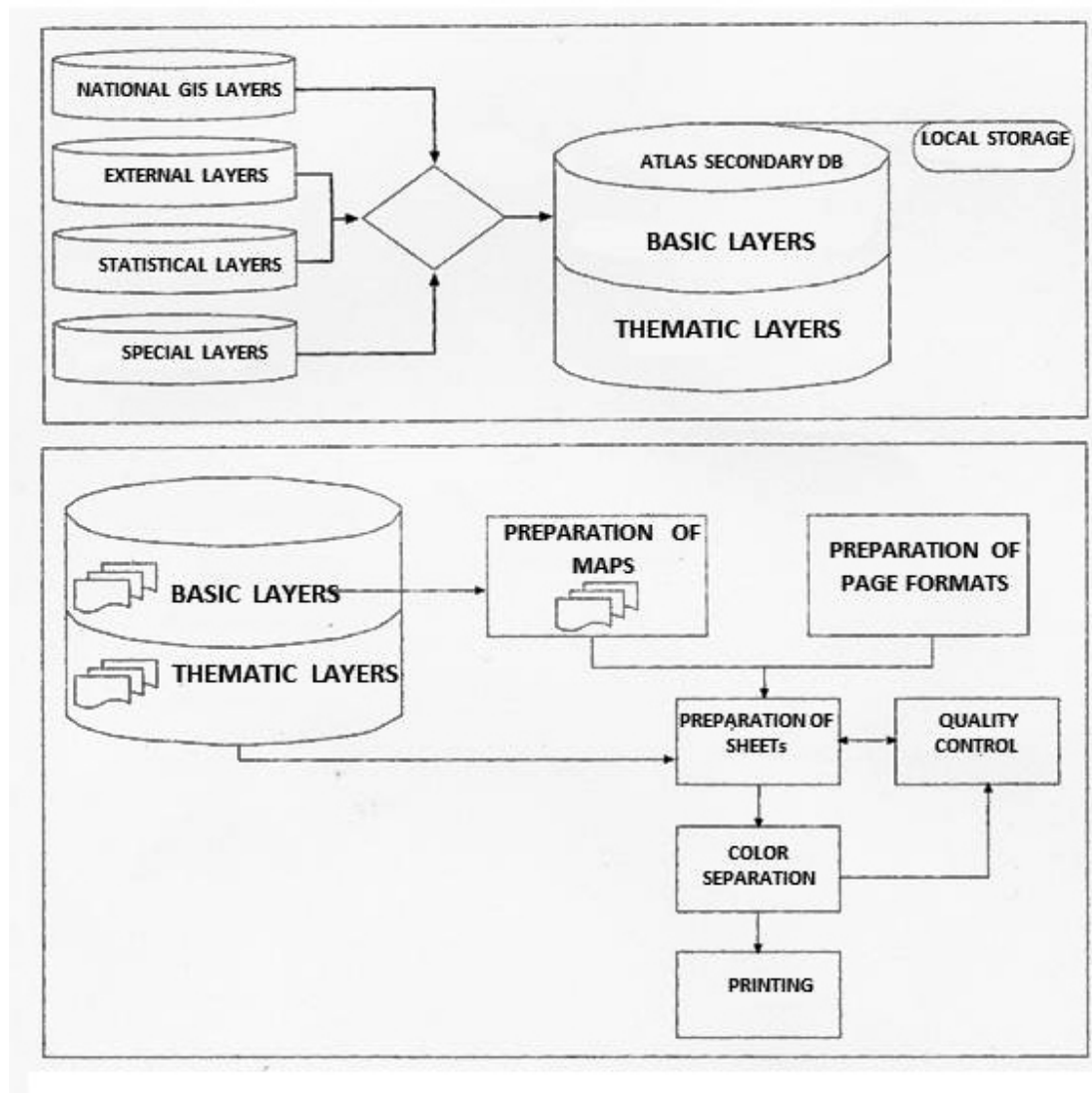


Figure 2: The Data Base and the working process (Following Tzkhory, 2004)

drawings; or to use data from precise and updated geographic databases like the National GIS and to use GIS tools for the production. Another option was to combine both methods. A full transition to GIS based production environment required developing a working process, which transforms GIS data extracted from data bases, to the layout and formats of the atlas, in order to preserve the appearance of the existing atlas. Such continuity was required by the Ministry of Education. The chosen option was to develop one comprehensive method for the cartographic production, with an interface to the existing data base which is updated and maintained continuously. This should support a sufficient graphic quality as well as the required preparations for printing. The advantages of this solution were: the achievement of a high degree of automation via programming, saving resources on the long run; and enabling future maintenance and easy updating as well as direct transfer to internet. The disadvantages were: the initial cost of programming; the slowness of the initial editing

process; and the relative lower graphic quality. The disadvantages were reduced as the work advanced, due to the improvement of the cartographic and graphic tools in the GIS software programs. The new maps produced for the second edition were more precise and more detailed than those of the previous edition. They can be easily maintained and continuously updated using less manpower. The main innovations in the new production environment are: production from GIS to color separation for printing; innovations in the preparation and processing of the geographic contents by the use of GIS tools; and the evolution to GIS based computerized cartography. (Tzkhory, 2004)

5. Examples of new subjects and innovations

The new atlas is a big step forward in a few categories: In thought – regarding the subjects and regarding carto-technical aspects; in computerization – all the maps were produced by the use of computers and innovative technologies; in the relevance of the atlas to the existing reality and to the geography learning syllabus in schools, while integrating ideas and comments from users of the atlas in the education system.

The prominent innovations include: Thematic maps showing Israel in comparison to Middle Eastern countries and the world according to various indexes like urban population and literacy; New subjects like the boundaries of Israel and their international status; The development of the desert frontiers; The coasts according to their morphologies; Many aspects of transportation systems and installations including their appearance on oblique photographs; Extension and innovation of the metropolitan section in the atlas due to the fact that over 90% live in cities.

Part of the subjects, which already existed in the previous edition, extended, including the administrative division and a special sheet dedicated to the regional planning policy. Special room is dedicated to show demographic, social and economic processes in Israel including employment, shopping centers, extension of financial services and reduction of agriculture employment. Carto-technical innovations include: didactic improvement like upgrade of maps and satellite images by scale and by production of satellite images in close to natural colors; an index of geographic names was added; relief was added to maps showing the urban development and to historic maps of Jerusalem. Examples of the use of new technologies include the comparison of oblique and vertical maps and photographs and the use of orthophoto as a background to selected rural and urban settlements, as well as the use of oblique photographs to enrich the appearance of the settlements on maps. Satellite

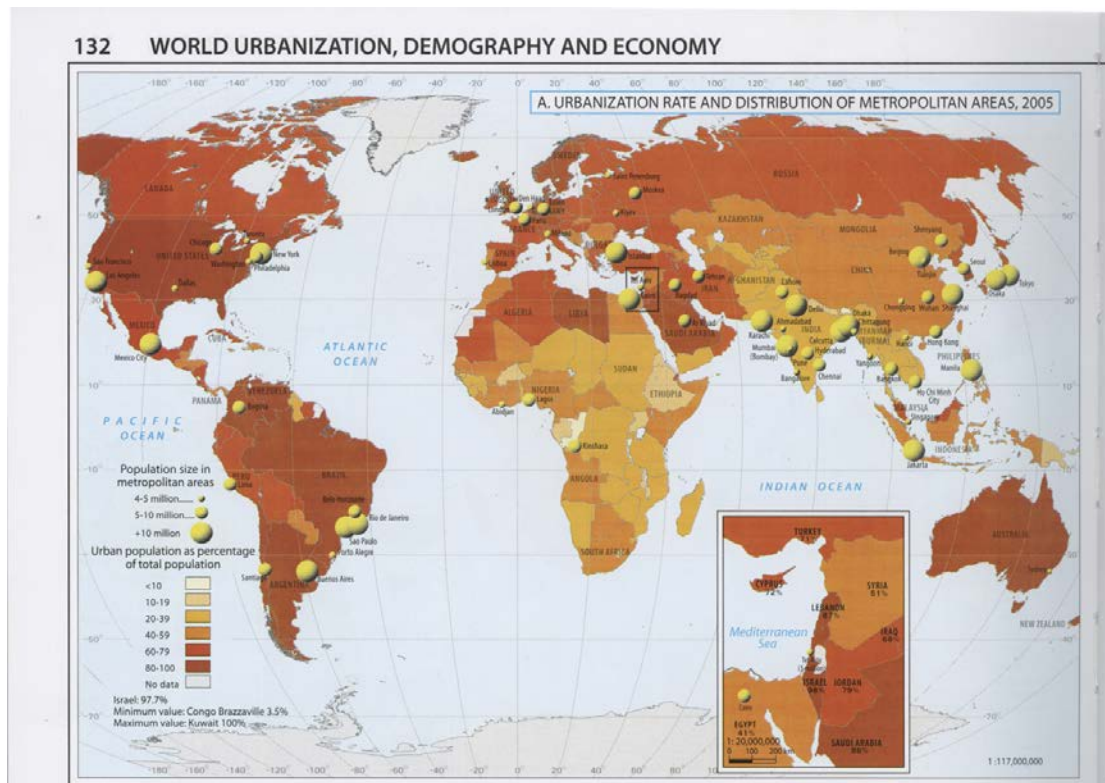


Figure 3: Urbanization – Example of comparison between Israel and other countries

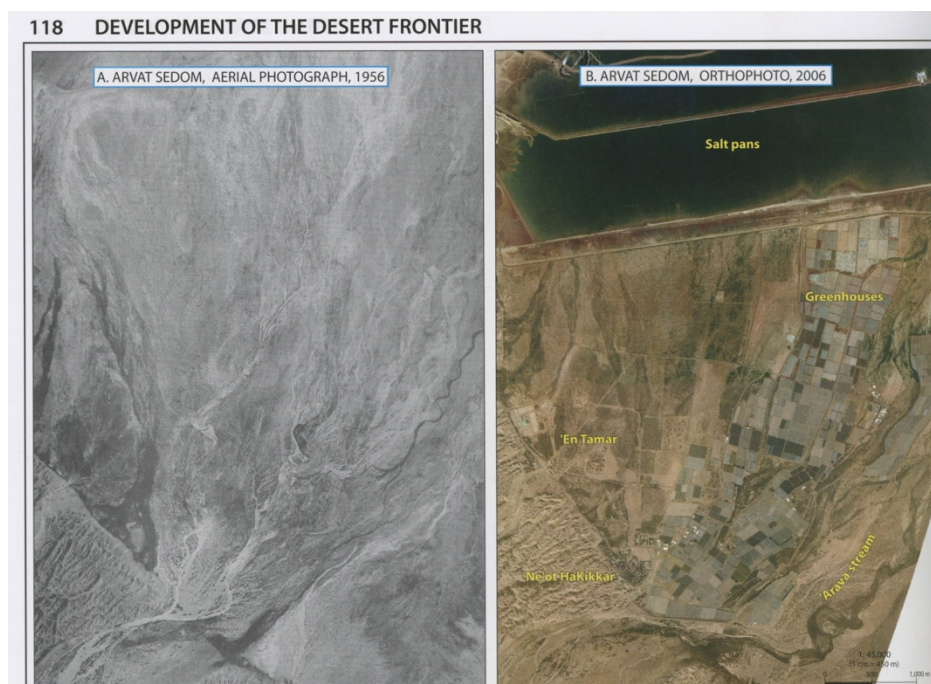


Figure 4: Example showing the development of the desert frontier

images were also used for illustration of atmospheric and weather phenomena. The use of colors for administration maps and three dimensional symbols geo-statistical information also improved many maps.

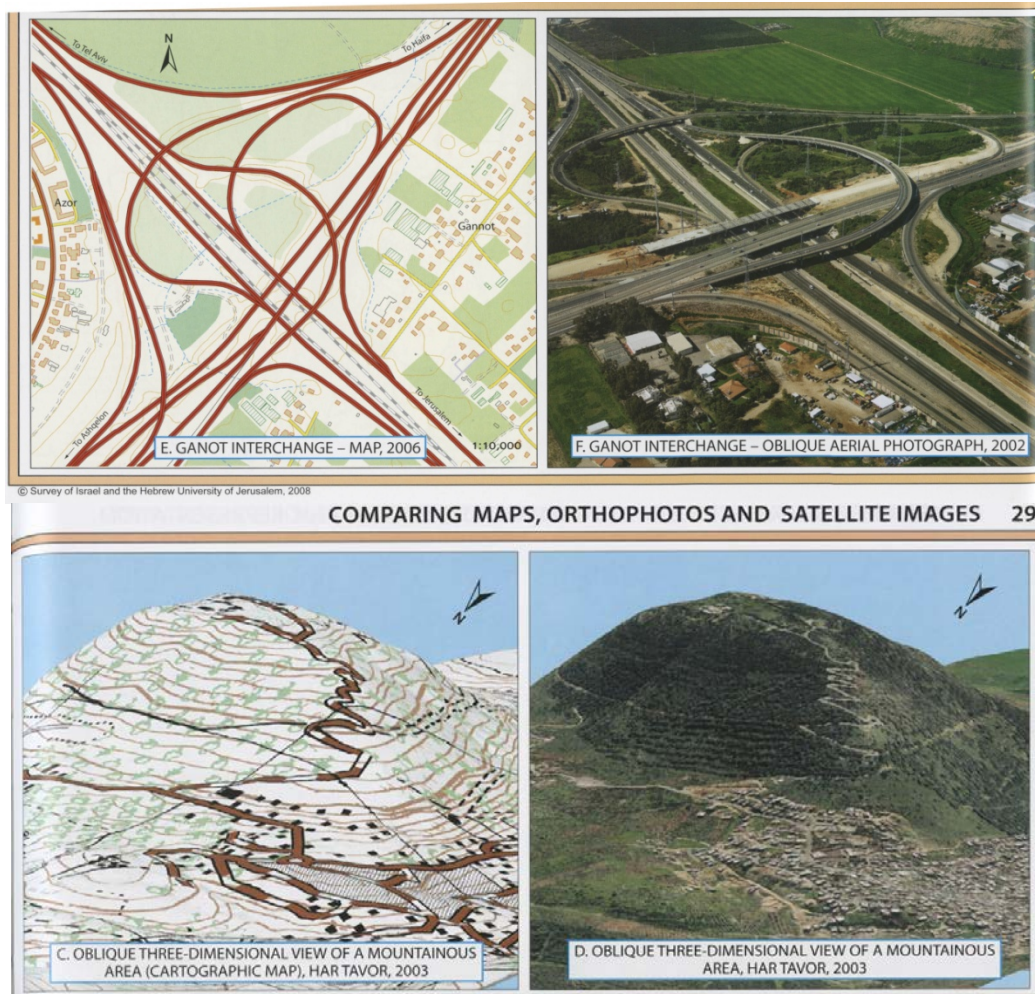


Figure 5: Examples of comparison between oblique map and image views

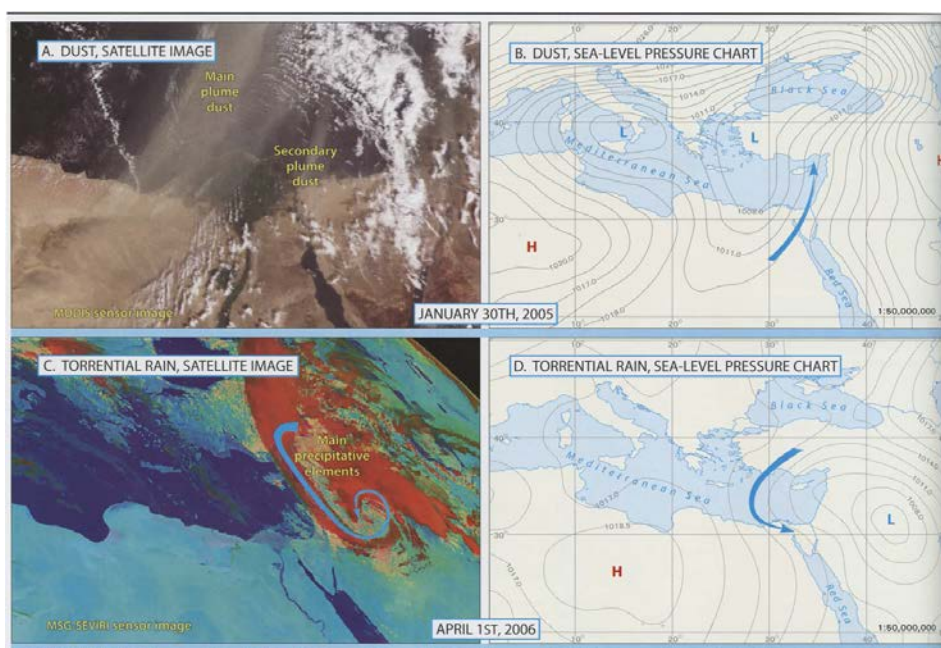


Figure 6: Examples of maps and satellite images presenting weather conditions

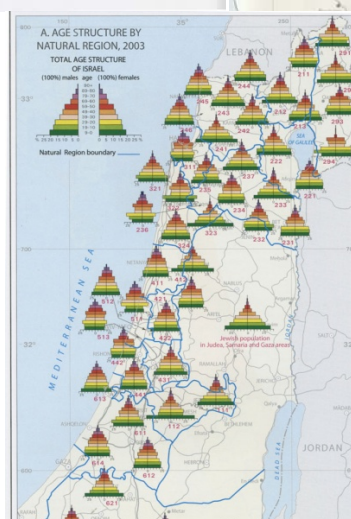
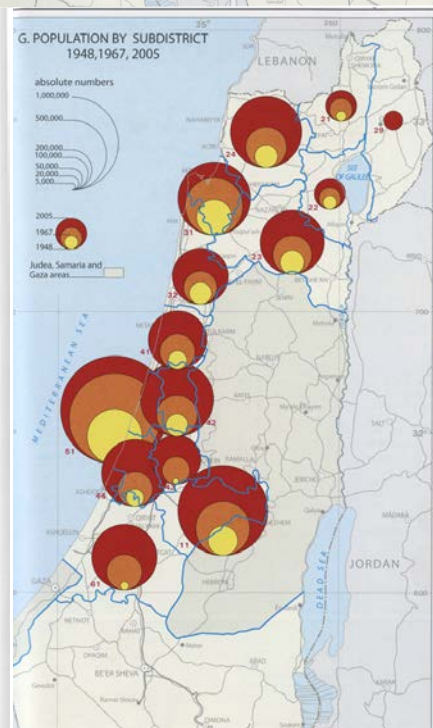
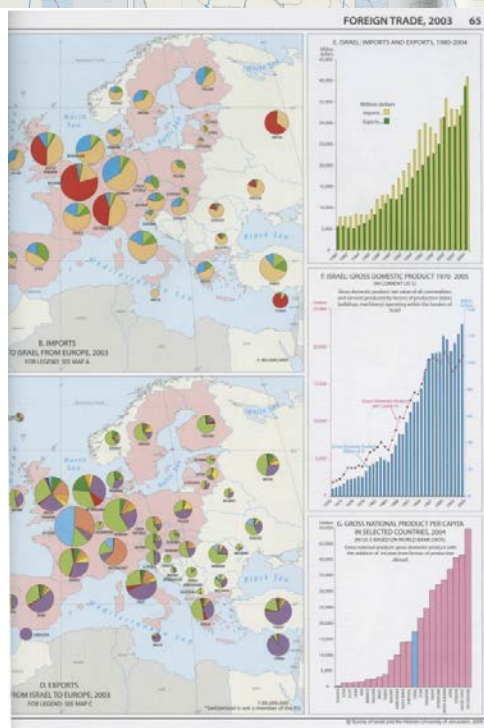
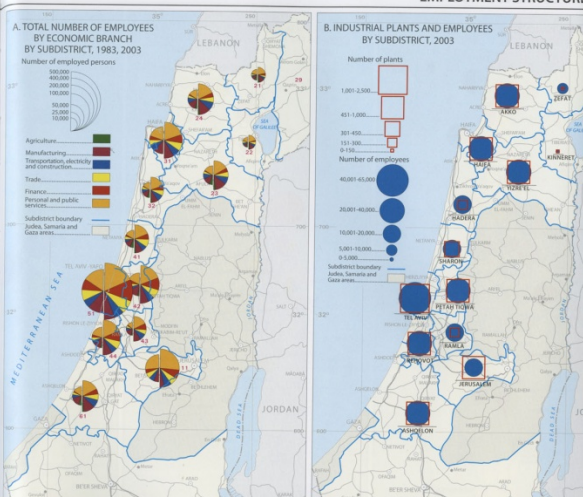
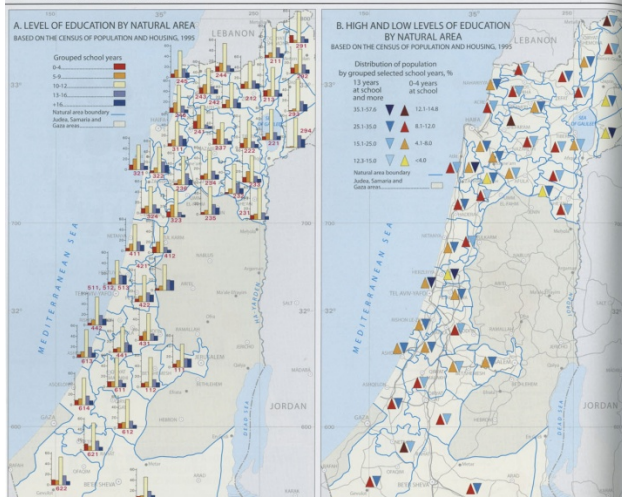


Figure 7: Examples of various types of symbols

6. Conclusions

Following three editions of a research based academic large format national atlas, which were published between the years 1952-1985, a New Atlas of Israel was published in 1995 in a smaller format aimed mainly for students and high school pupils. A second edition of the new atlas had been prepared during the last decade, using up-to-date authoritative data and innovative technologies, adopting new didactic innovations.

This atlas extended in order to hold more information which is relevant to a national atlas. The addition of nation-wide authoritative information as well as new relevant subjects beyond the limited perspective of an atlas for high school pupils led the editorial board to extend the name of the atlas to The New Atlas of Israel – The National Atlas. This extension which approached the atlas closer to the original purpose of the National Atlas of Israel could not be completed because of time constraints and limitations regarding its format and weight for the use of school pupils.

This direction should be intensified in order to accomplish the goal of making the new atlas of Israel a comprehensive national atlas. In addition, The New Atlas of Israel – The National Atlas was fully produced by the use of GIS-based computerized processing. The intention is to transform it in the future into a digital atlas. The digital version should be available interactively to users through the net. The digital version will enable the editorial board to try to cope with additional challenges like the implementation of a three or four dimensional GIS that will monitor temporal changes. This is important for the users and is required due to fast development and changes, especially with regard to fast urbanization and the developing need for improved exploitation of the limited geographical space. Such need is translated into construction of three dimensional complexes of buildings, infrastructure tunnels and traffic channels, which require three dimensional presentations.

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